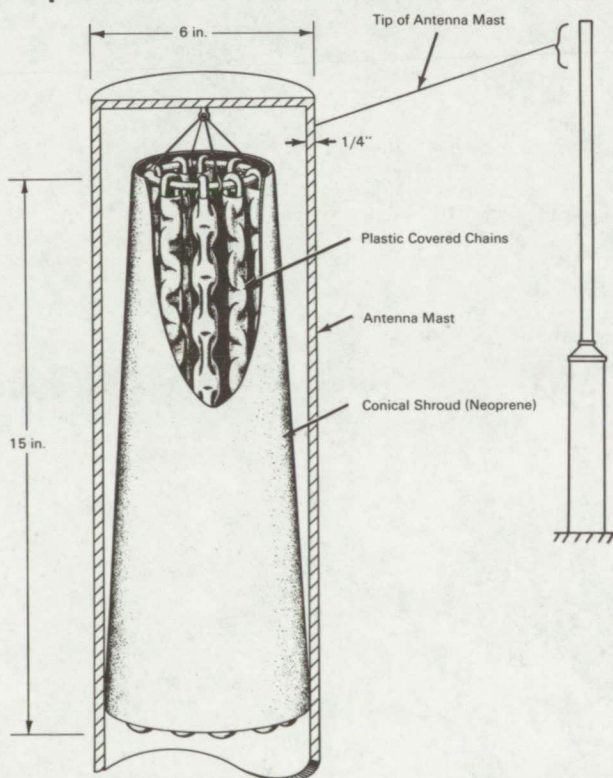


NASA TECH BRIEF



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Suspended Chains Damp Wind-Induced Oscillations of Tall Flexible Structures



The problem:

To design a damping device that will suppress wind-induced bending oscillations of tall cylindrical antenna masts. Such oscillations have been observed to occur over a range of wind speeds including light steady winds. It was necessary to rule out other approaches that would require guy wires or would alter the exterior surface of the mast.

The solution:

A cluster of chains suspended inside the tip of the antenna mast. Each length of chain is covered with a

flexible plastic or rubber sleeve, and the entire cluster is enclosed in a neoprene shroud. The damper weighs 12 pounds. Its effect on the antenna mast, which weighs 261 pounds, is to increase damping of the fundamental mode from approximately 0.5 percent to 10 percent of critical damping (a twentyfold increase). With the damper installed, there was no indication of the response peak at 5 knots which occurred with the undamped antenna and the response peak at all other speeds was also significantly reduced. The vibration response at wind speeds up to 60 knots,

(continued overleaf)

for the damped antenna was below the response peak at 5 knots for the undamped antenna.

Notes:

1. This hanging-chain system, which is a form of impact damper, functions as a simple and effective method of damping structural vibrations. It is believed to have other potential applications in structures subject to horizontal vibration, such as towers, stacks, and bridges.
2. Design information for predicting the performance of hanging-chain dampers has been developed for general applications.

3. Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Langley Research Center
Langley Station
Hampton, Virginia 23365
Reference: B68-10042

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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